CNC Machine

User Manual

For CNC

Warnings and Cautions:

1. The operating staff must undergo a rigorous training, and must pay attention to their personal safety and the safety of machine in the operating process; besides they should operate the engraver machine in strict accordance with the operating rules and regulations.
2. The demand for voltage supply is 220V/50Hz.if the power supply is unstable or any other big power electric equipments are used around, we need to add stabilized power supply.
3. To avoid strong electric, magnetic and other equipments that affect transmission signals of engraver machine seriously, such as: welding machine, transmission towers, etc.
4. Engraving machine, control box and the computer must be safely grounded to prevent static interference.
5. Don not unplug or plug the signal lines and NC-swappable cards electrified, in order to prevent the burn of NC card and other electronic components. Please unplug the power plug when the machine is not in use for a long-term. Please turn off the power timely when the machine does not work.
6. Do not frequently start control box in a short period in order to prevent the burn of converter or other electronic components.
7. Check whether the plugs loose frequently. If there is a certain loosening, please cut off the power at first and then get it fixed.
8. Ensure the cycle of cooling water flows smoothly in the processing and no impurities in the bucket, the water temperature will not exceed 40 degrees and regular replacement of circulating water.
9. Do cleaning work regularly to maintain no debris on ball screw and rail. wipe with a clean cotton cloth and add lubricants.
10. The graver is very sharp, so it is prohibited to hand-to-machine when it is running in order to prevent the injury. Do not use handkerchiefs, scarves access to the machine to prevent the involvement or damage equipment.
11. Proficiency in the use of a variety of gravers and accurate method of setting as well as the correct installation method of graver. Re-tighten the nut to bear a little better, when replace the graver.
12. To master engraving software installation method and the setting method skillfully in order to facilitate the installation in the future.
13. Do not dismantle to repair or modify the machine privately without the authorization of original company, so as to avoid damage caused by man-made or warranty failure.

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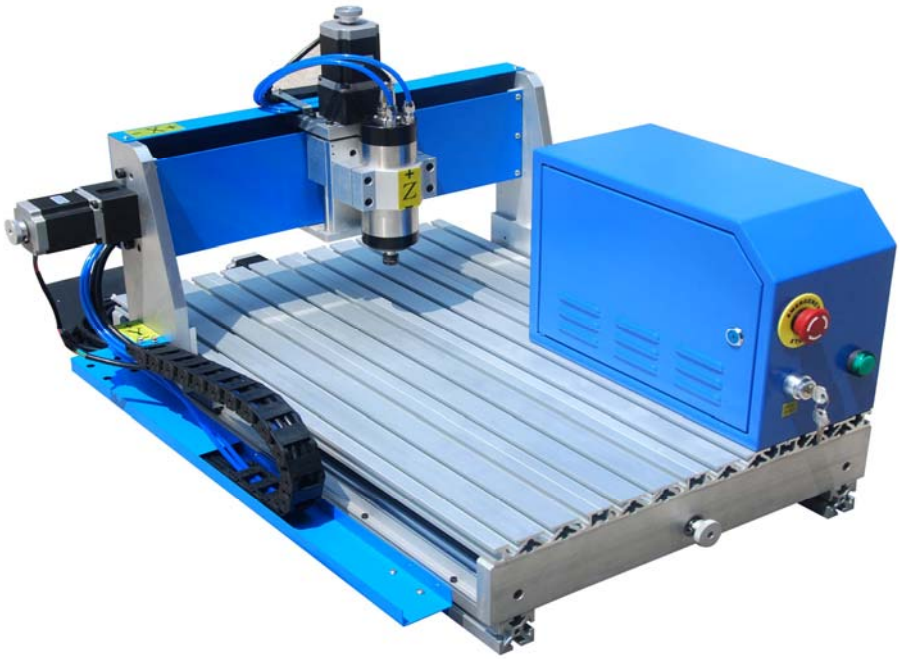
Chapter I Mechanical Engraving Machine Summary

Mechanical Engraving Machine: RS-3040 Relevant Parameters

Worktable Size (mm):400 X300
XYZ Working Area (mm):400x300x80
Max Moving Speed(mm)：4000
Max Engraving Speed (mm/min):4000
Resolutions (mm):0.03
Repeatability (mm):0.03
Max Feed Height (mm):90
Drive Type: Mico-step stepper motor
Spindle Power: 0.8 KW
Spindle Speed (rmp):0—24000
Spindle Tools: ф3.175
Command Code: G-code

Performance Features:

- Three –axis all adopt the imported ball screw with original package, working steadily, ensures high precision
- The adoption of high subdivision drive ensures high speed and high precision.
- Water cooling variable frequency and brushless high power spindle, good speed adjustable performance, wide range, high running efficiency, smaller noise, powerful cutting capacity, can work for a long time with mass production, user-friendly design can be disassembled, and easy to installation and transportation.

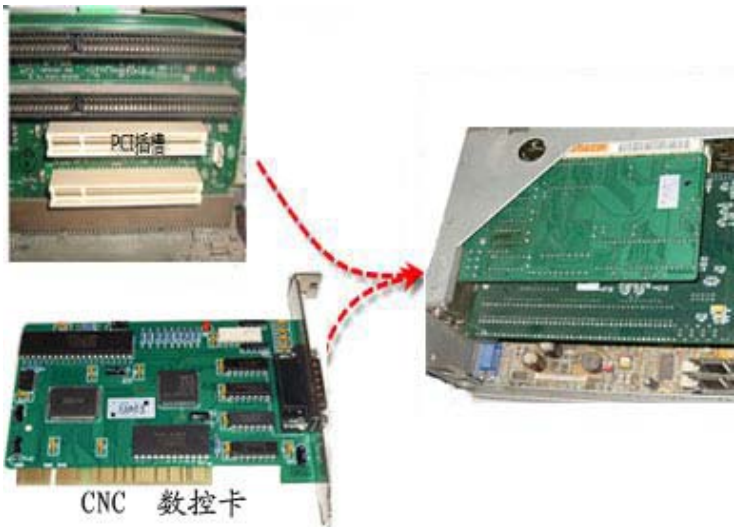


Chapter II Mechanical Engraving Machine Instructions

First. Engraving machine and computer connection

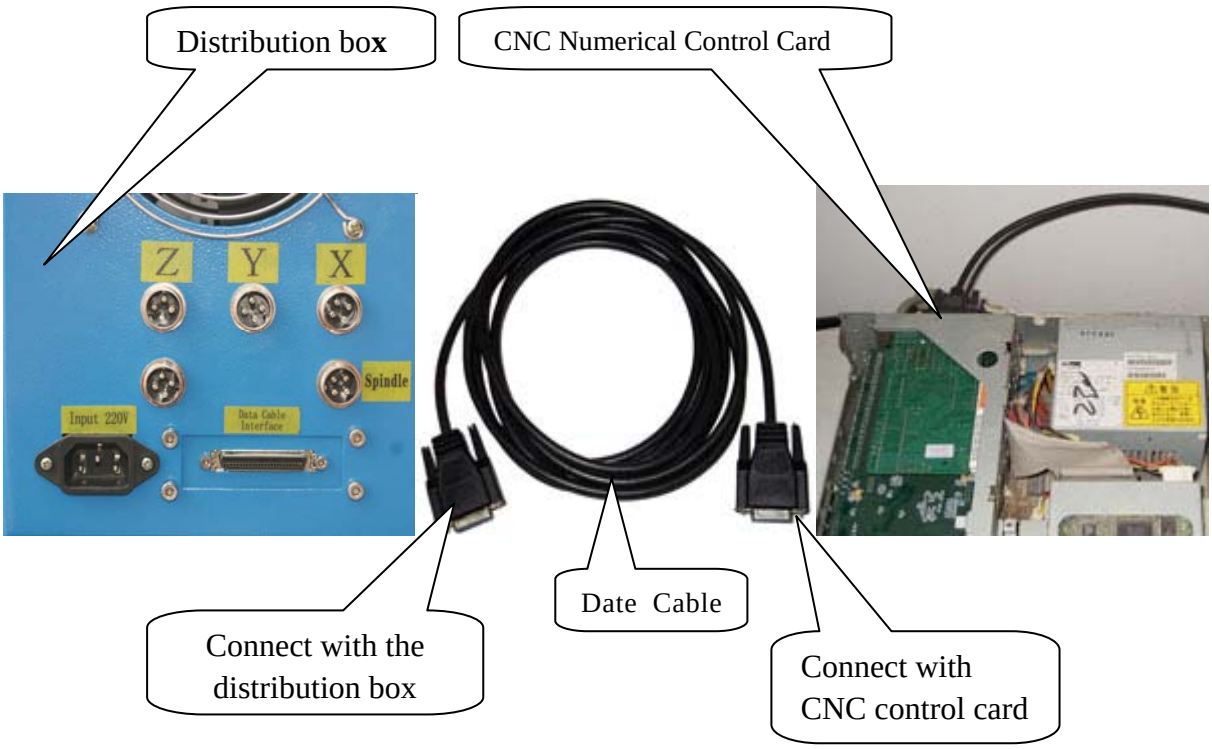
Engraver machine and computer connection (pictures)

Please ensure that your computer has PIC slots, insert the CNC control card into computer in the condition of shutdown. Watch out when insert and pull out it, and ensure the control card was inserted completely.(software and CNC control card driver must be installed beforehand, details refer to instruction.)



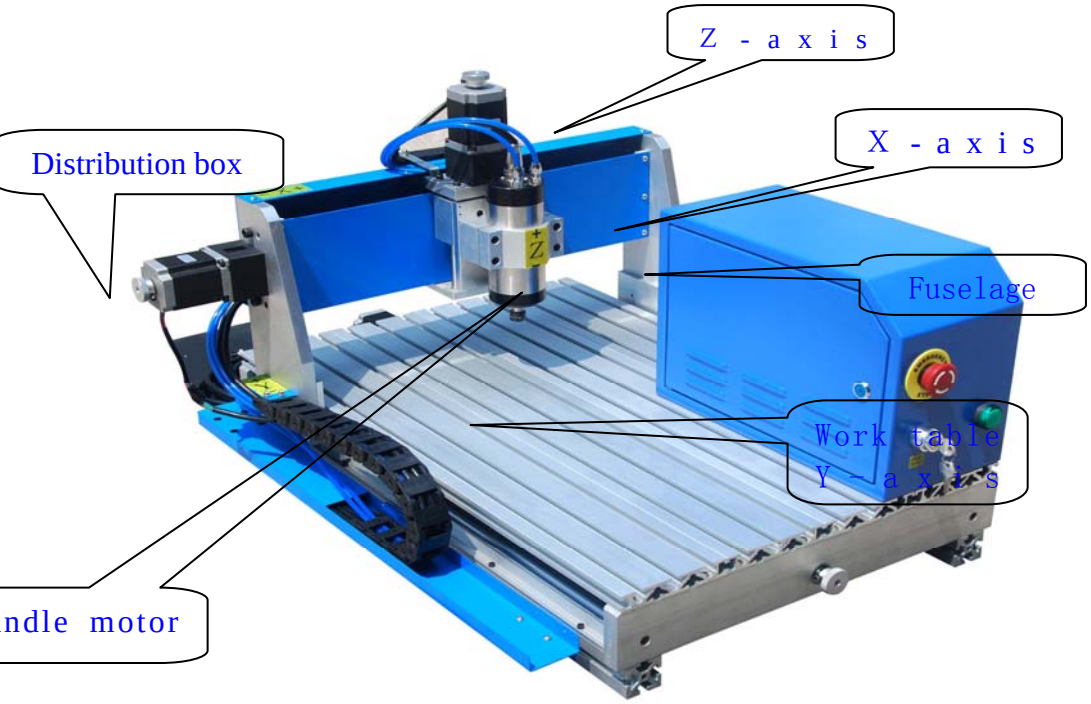
After the installation of CNC control card, use data cable to connect engraving machine and computer. One end of the data cable links to the back serial port of engraver distribution box, the other links to the CNC control card of computer.

Notes: do not bend and break the pins when plug in and pull out the data cable.

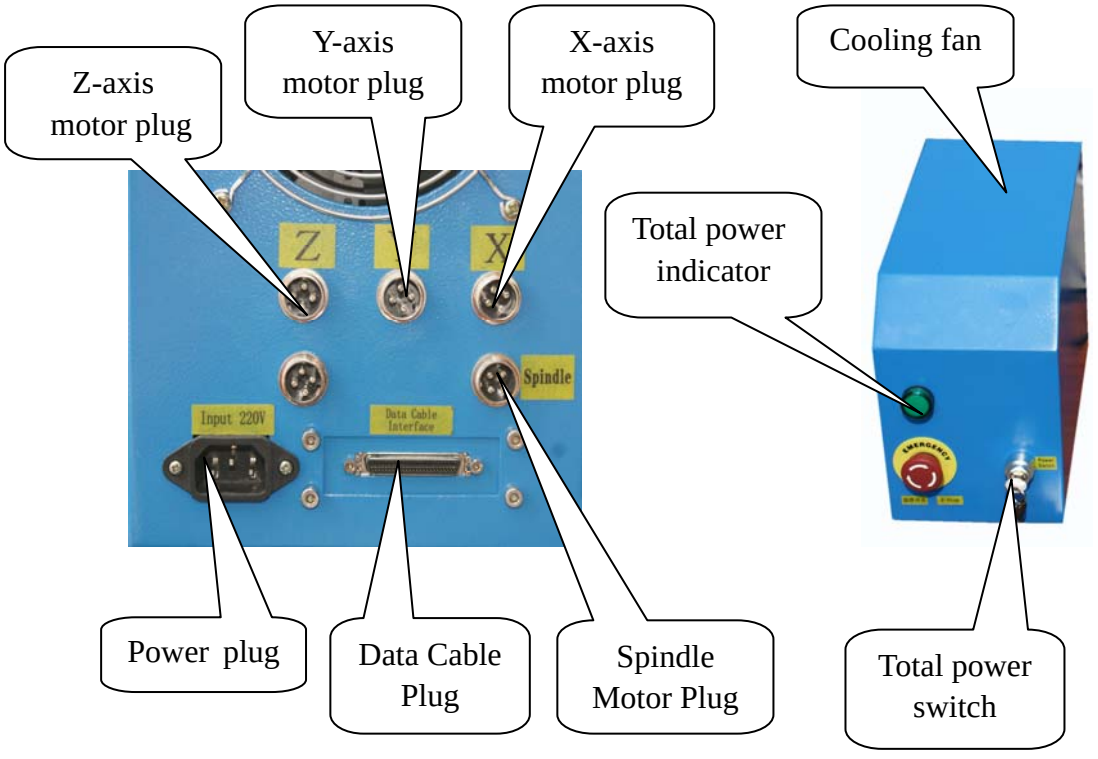


2. Engraving machine summary

（1）Engraver machine specification



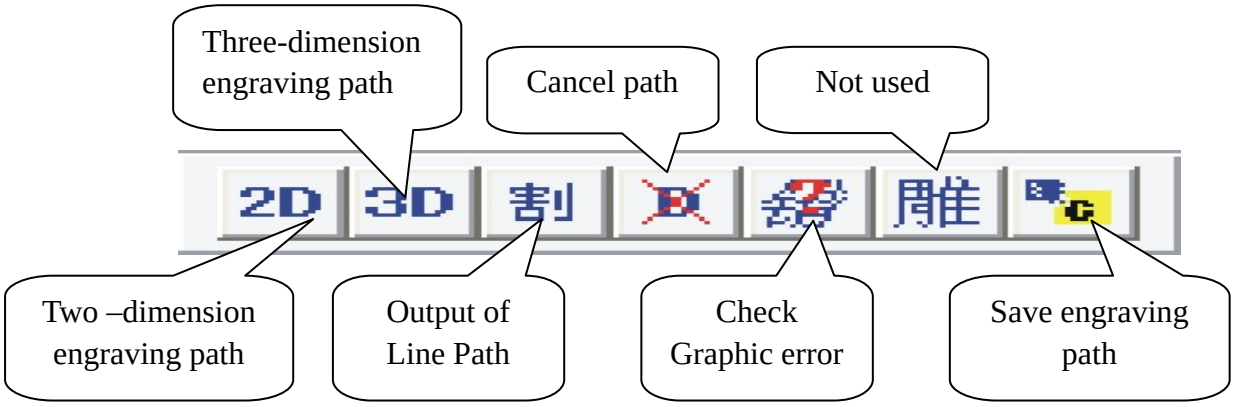
(2)Distribution box specification



Chapter Ⅲ Mechanical Engraving Machine Operation Steps

In artcut software（ CorelDraw、AutoCAD、type 3、ArtCAM、other Graphics software, etc.）,finish the processing graphics well, and place the graphics on the lower-left corner of the page to generate the path.

First. the generation of artcut software

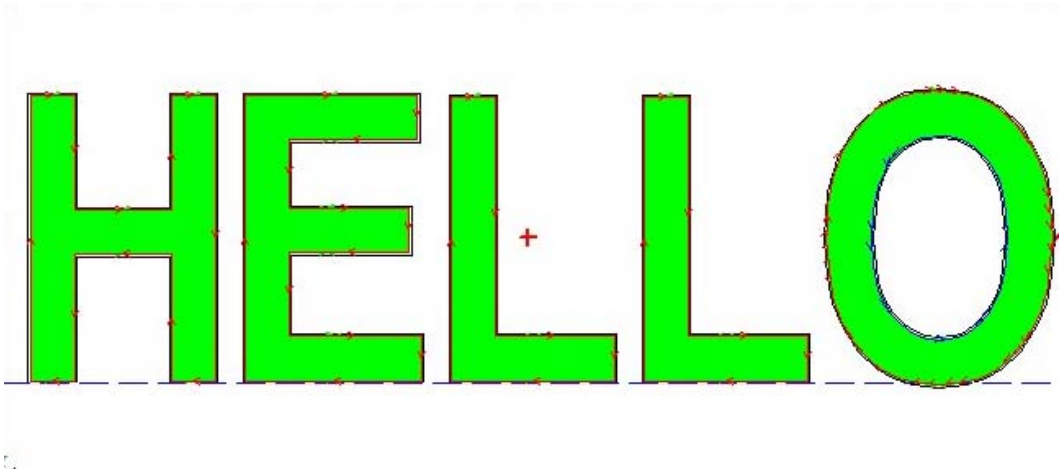


A. the generation of two-dimension

Select the path that will be generate, then click

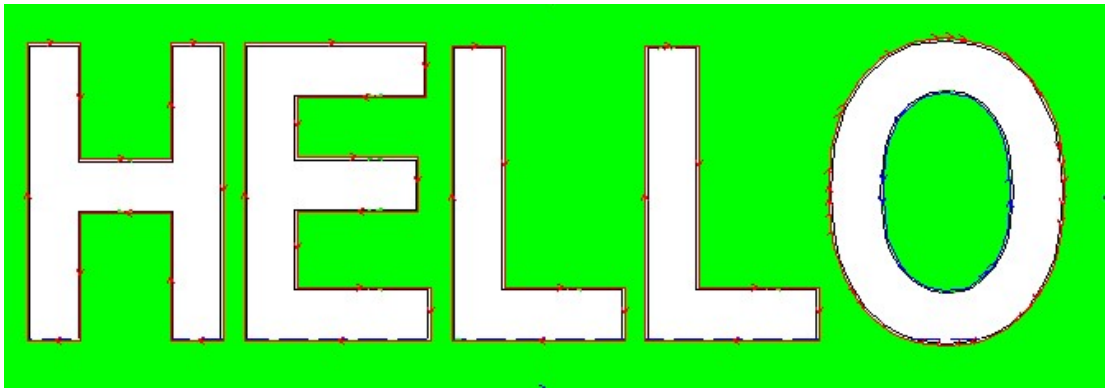
1：Female Engraving and Male Engraving

Effcet of female engraving ---engraving inside the graphic



Above picture shows female engraving effect

Follow graphic shows male engraving effect



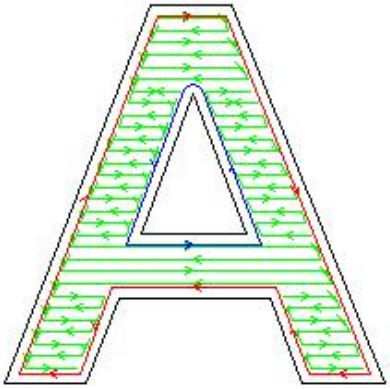
Effect of male engraving---processing outside the graphic

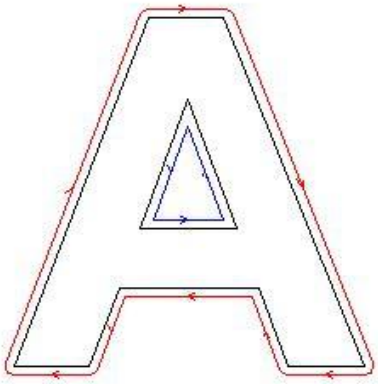
Male engraving method：add a closed outer frame to the processing project, then put together both ,still select male engraving in 2D.the outcome is male engraving effect.

2：Engraving Depth

According to your requirements to set up depth

3：Engraving Method





The Level of End milling ⇧ Edge Enhancement ⇧

4：Tool storage

Conical Flat

5:Re-processing method generally "edge enhancement"

This is used in the combination with carving method, but note that: the selection of tool must be the same as the tool which is used in the carving method.

B: the generation of three-dimension 3D

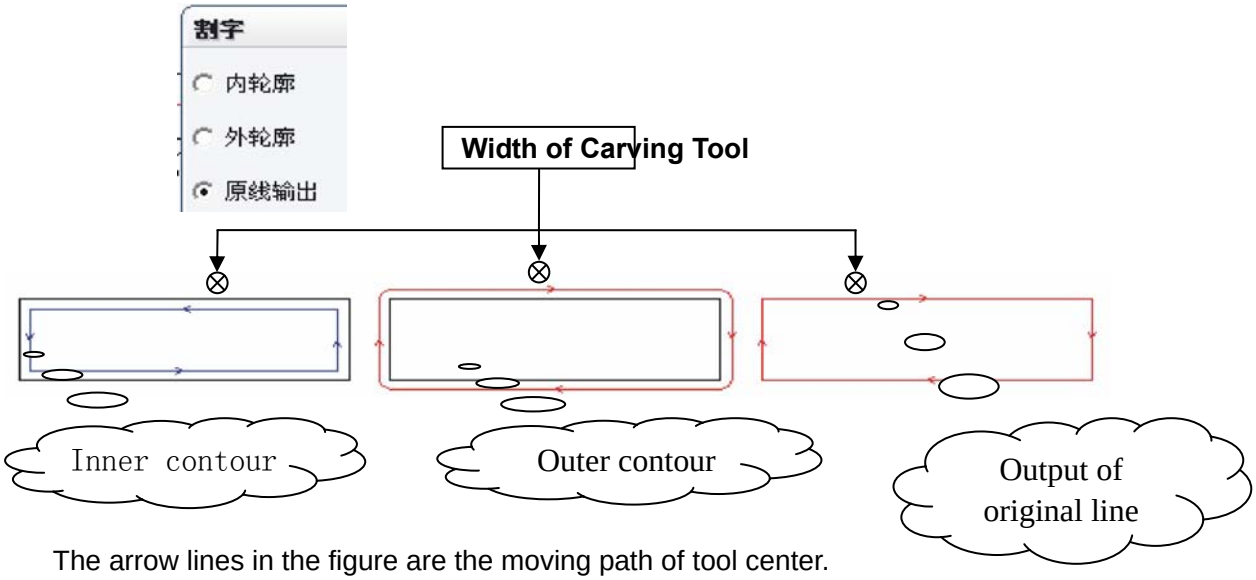
1: Female engraving all female engraving

2: Engraving depth 1/2 of material thickness

3: Tool selection centre knife

C: generation of cutting path

1: output ways of contour line



The arrow lines in the figure are the moving path of tool center.

When output of inner contour, the processing size is the preset size minus the size of tool diameter；

When output of outer contour, the processing size is in accordance with preset size；

When original line output, the processing size is preset size minus the half size of tool diameter;

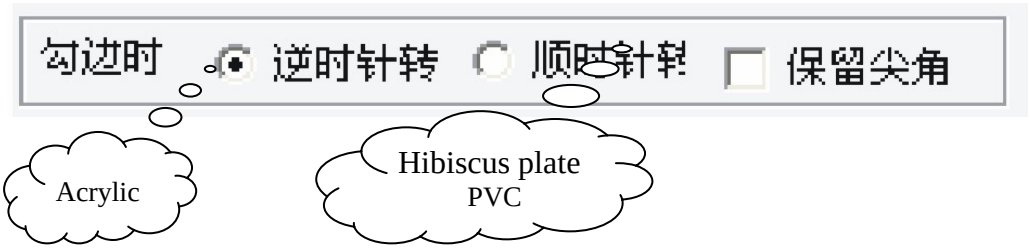
2: Tool selection, straight tool

3: Engraving depth

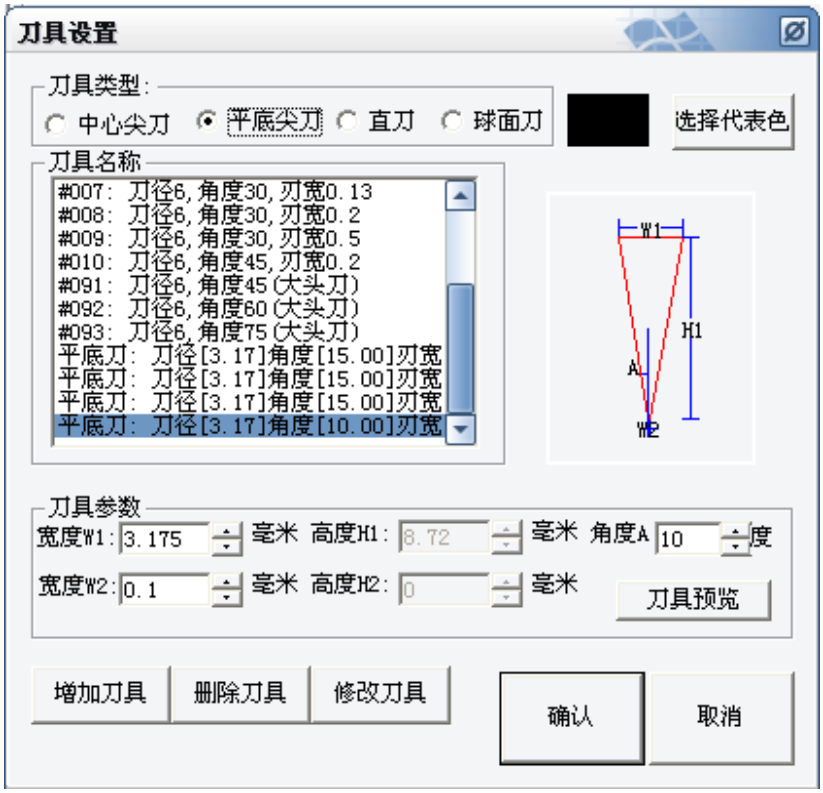
When cutting words, the carving depth can be set to zero, machine tool(Z-axis)to the table as a reference point for cutting (this method is not easy to damage table)

4: Edge enhancement direction

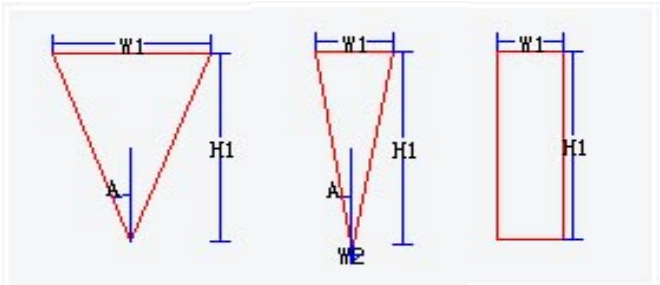
When selecting the inner contour and outer contour, you can select edge enhancement direction. select clockwise direction in cutting hibiscus plate and PVC plate, counter-clockwise in cutting acrylic plate.



Second .Tools Management 刀具库



1：Tool classifications



1. V-Bit Mill Conical flat End Mill

Application ： V-Bit Mill ： 3D

Conical flat ： 2D（two-layer plastic board，class brand sculpture）

End Mill: cutting

Application of Tools：

Five kinds of Tool：

1、Conical flat：used in shallow depth cutting two-layer board, organic board, wood, metal(special use for metal).(Note: the smaller tool edge, the slower processing speed; when cutting metal, slow down the speed and add some cooling liquid; or else it is easy to break the tool; especially engraving metal with a layered approach as

much as possible.

2、Thread cutter：Mainly used in organic board, PVC material

3、End Mill：Cutting two–layer plastic board, thin PVC, wood board, Styrofoam

4、V-Bit Mill：Cutting ABS board and Aluminum board used in construction model. it can not be used in milling engraving

5、３D Tool：used in three-dimension trajectory angle words, three-dimension engraving is the most common method in carving. mainly for organic board and wood material engraving. Selection of the tool was primarily based on the thickness of strokes and the depth of engraving

2：Parameter Setting

V-Bit Mill ：W1，H1，A three parameters

W1 is the sewing part diameter　　A is half angle

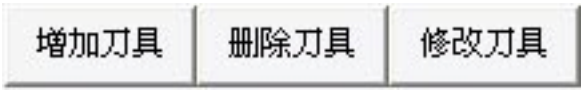
Conical Flat：W1，W2，H1，A four parameters

W2 is tool tip width　　W1 is diameter of sewing part, A is half angle

End Mill：W1，H1 two parameters

H1 is blade height　　W1 diameter of sewing part

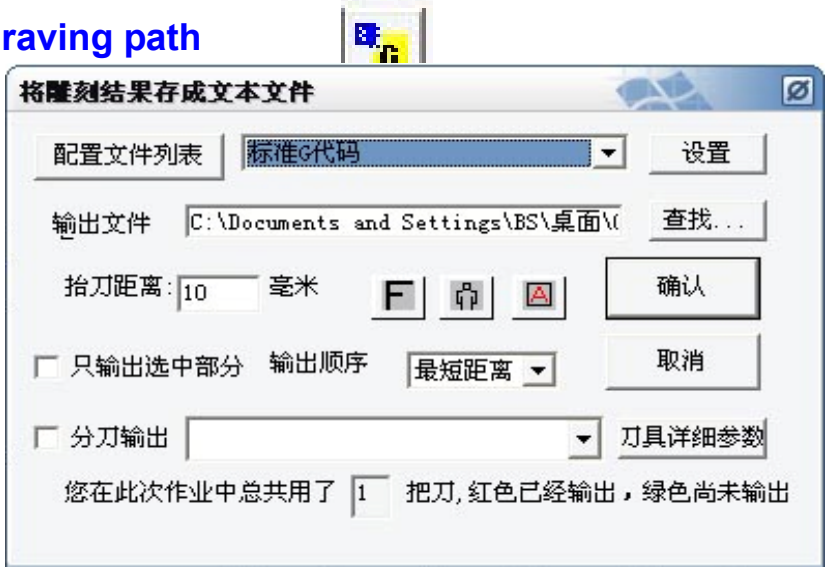
3：Tool Addition



After filling in parameter, single click “tool addition” button to add a new tool (if uncertain about The parameters, amount the scale directly)

Click “OK” button after selecting appropriate tool

Third , save engraving path

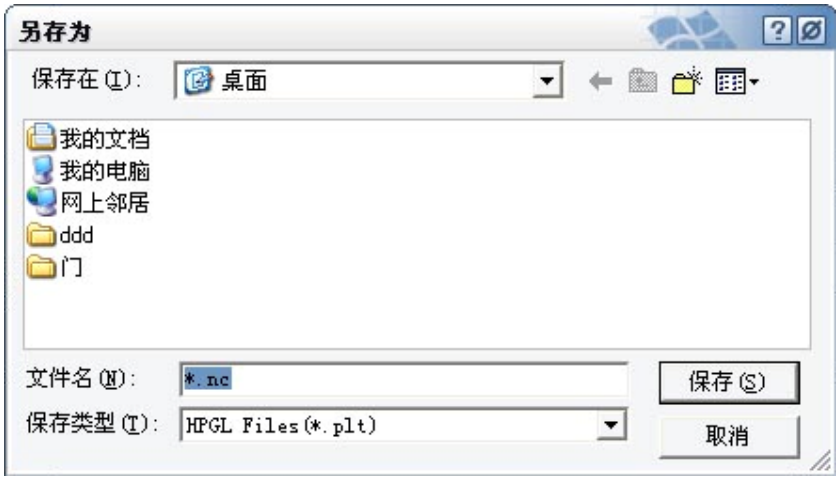


1: Code Format

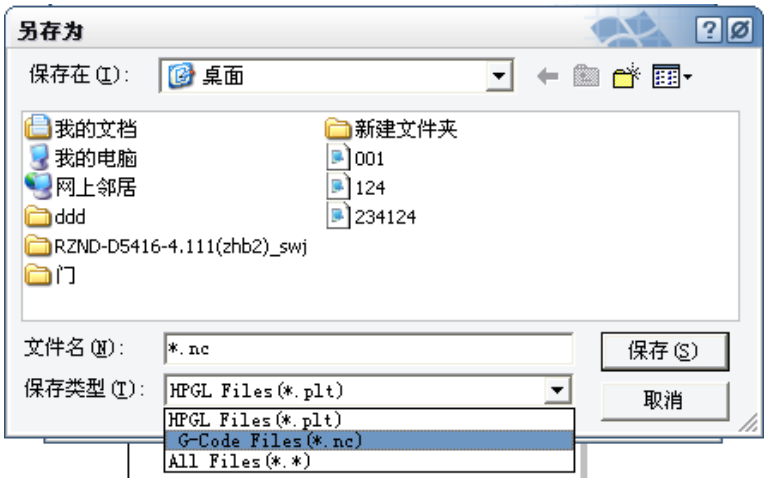
Code Format selection “standard G code”

2: Save Path

Click “search” to select save path, and then make a name for file



3：Save Type: set the save type to“G-Code Files (*.nc)”



4: Tool up Height

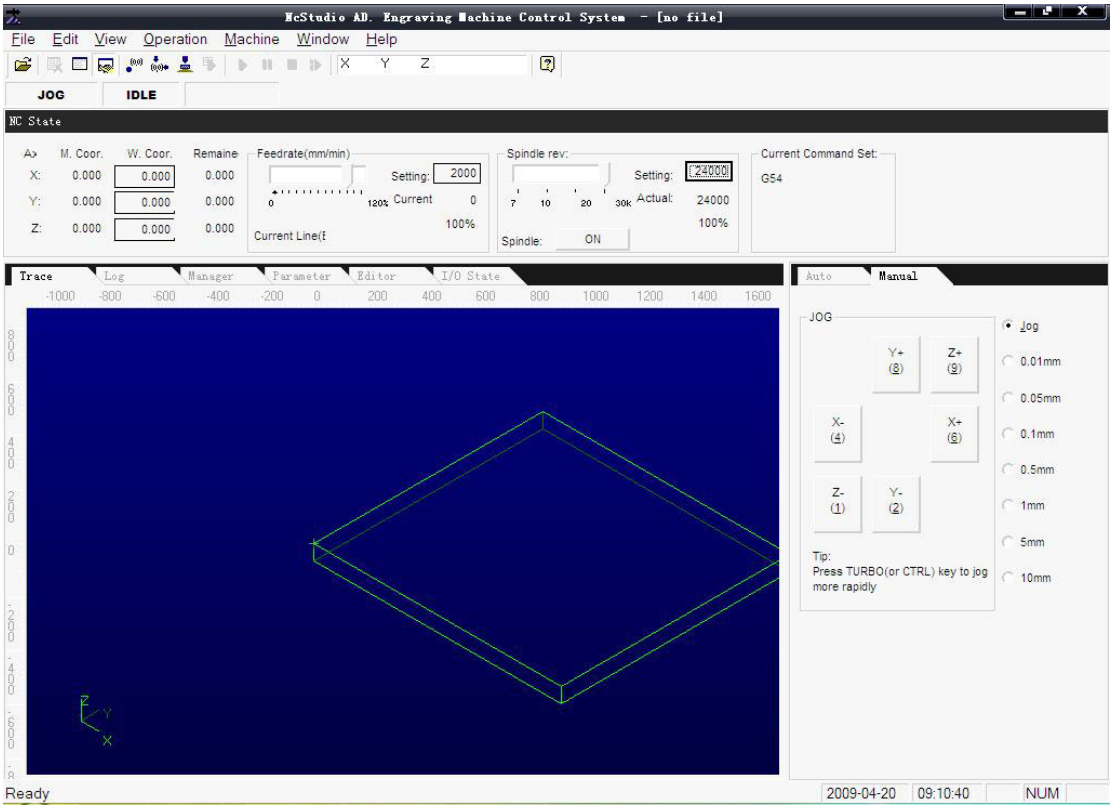
According to the situations, the higher the tool, the slower the processing speed.

After saving file, you can enter into the operating part of engraver. You can refer to artcut Help file to see deign part.

After finishing the processing path, tightening material to worktable table (thin material, like double-color board、organic plate, etc. use double-adhesive to stick material on the table, use board to suppress thick material),enter into **Ncstudio™** system to output processing.

Four: Motion control system Ncstudio™ V5.5.60 operating steps

Install Ncstudio software at first，refer to details in the software manual, open Ncstudio software interface as follows:



1： Boot reset (optional, if there is no limit switch, please do not choose this)

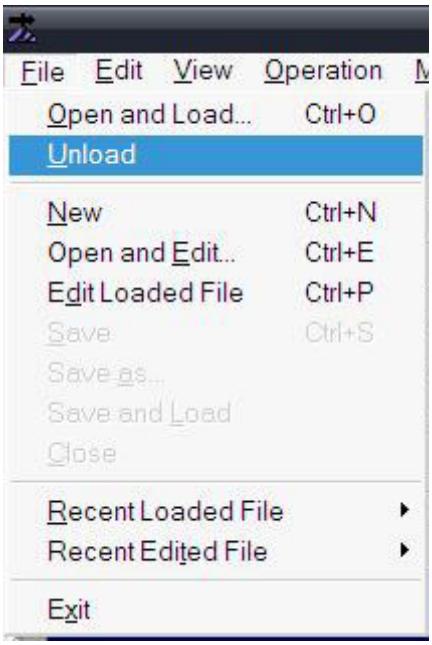
Click on the manu

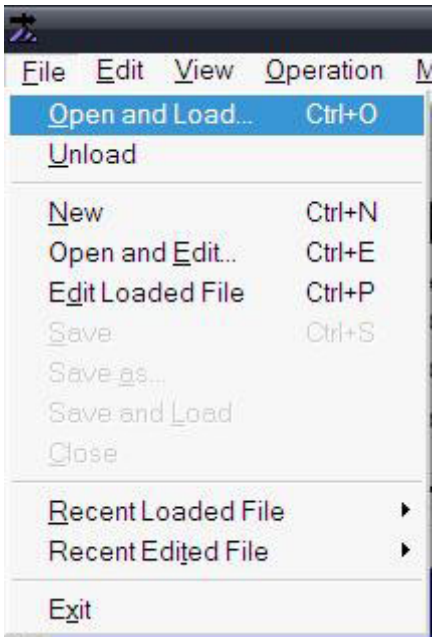
Operation ⟶ Back to mechanical origin ⟶ reset tip, click the all-axis can also reset

After resetting, click close (after the machine stopped operating)

2：unload,load engraving file

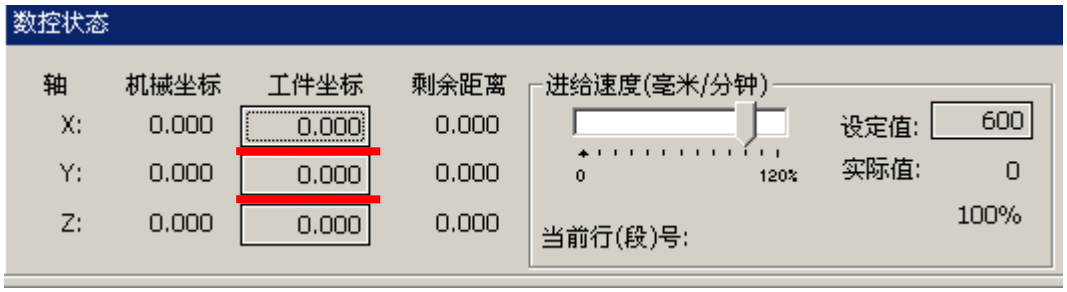
►





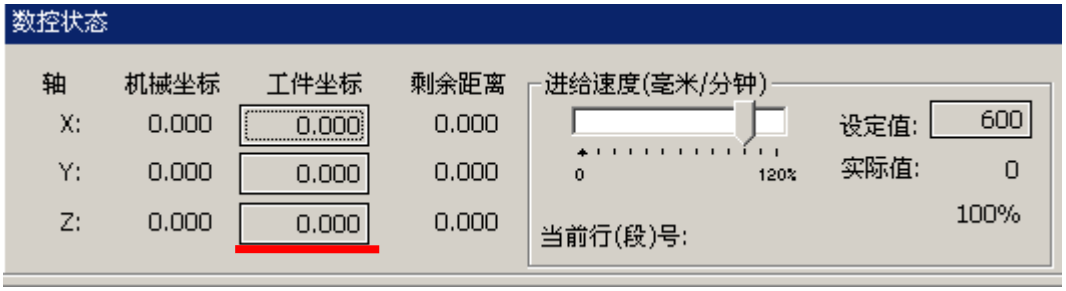
3：Set processing origin

When the tip at left cornerof the material,set X、Y coordinates to zero.

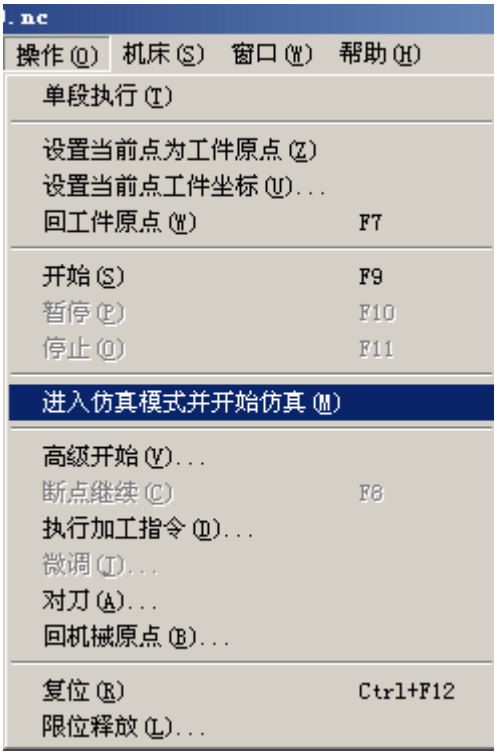


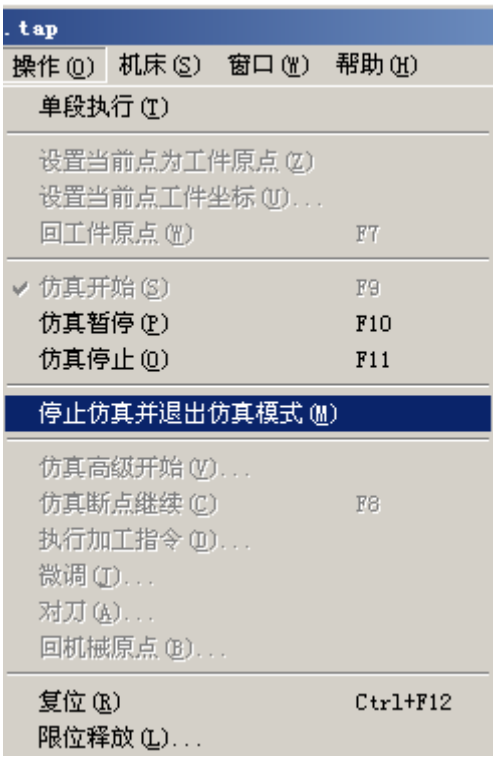
4：Tool setting

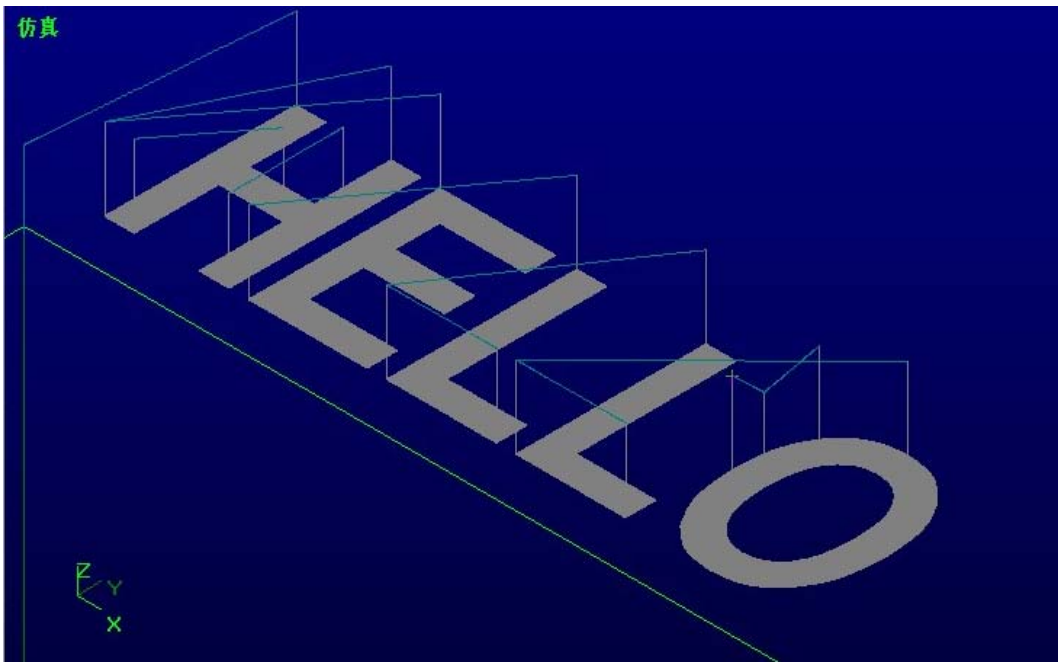
Make the Z-axis Downward movement manually, set the Z coordinate to zero when the tip contacts the surface of the material.(start the spindle when seting the origin of Z-axis in order to prevent damaging the tool).



5：Simulation, cancel Simulation <shortcuts F8>

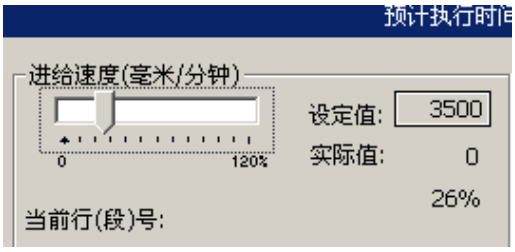




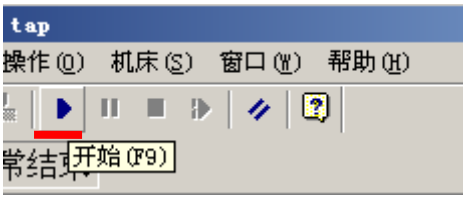


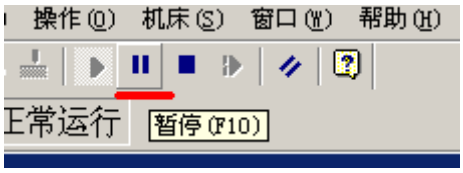
(to view whether the document is correct or not in the processing path window, the document could not exceed the green box of the software, then cancel simulation after confirming the accuracy)

6：To slow down feed rate, open and adjust the spindle speed (Note: to ensure the cooling water cycle of the spindle is normal)



7：click the start button(F9) to processing; Pause（F10）





Stop （F11）

Chapter III Common Problems and Solutions

Fault phenomenon	Fault Reason	Solutions
The axis does not move around or move abnormally	1. NC card loosening or fault	Re-inserted or replaced NC card
	2. Drive failure corresponds to the axis	Replacement of the motor driver corresponds to the axis
	3. Stepper motor failure corresponds to the axis	Replacement of the stepper motor corresponds to the axis
	4. Shaft coupling corresponds to the axis break out or loose	Tighten or replace shaft coupling corresponds to the axis
	5. Screw fracture or failure of screw nut corresponds to the axis	Replacement of the screw corresponds to the axis
	6. Linear Bearing corresponds to the axis failure	Replacement Linear Bearing corresponds to the axis
	7. Drive failure or electric current sub-set error	Adjust the drive parameters and corresponds to the software settings

Z-axis out-of-control	1. NC card loosening or fault	Re-inserted or replaced NC card
	2. Z-axis electrical line failure	Check Z-axis electrical line
	3. The path is wrong	Import the correct file path
	4. Inverters or electrostatic interference	Check the ground wire
	5. Computer virus or system problems	Reinstall or replace the computer system
Rotating spindle abnormal voice	1.Inverter settings error	Reset inverter parameters
	2. Spindle does not turn	Check the spindle motor line
	3. There are problems with the main axis	Replacement of the spindle motor
Spindle stop switch	1. NC card fault	Replaced NC card
	2. Inverter parameter setting is incorrect, or their own fault	Reset inverter parameters
	3. The main axis or data line short-circuit	Inspection or replacement of data lines to connect
	4. Spindle short-circuit	Repair or replacement of the spindle motor
Wash at the end of injustice	1. Spindle does not perpendicular to the surface, need correction.	Adjust spindle perpendicular to the surface
	2. There are problems with tool	Inspection or replacement of tool
	3. There are problems with NC card	Replacement NC card
Output error	1. NC card loosening or fault	Re-inserted or replaced NC card
	2. Drive failure	replacement of the driver
	3. Stepper motor failure	Replacement of the stepper motor
	4. Drive failure or electric current sub-set error	Adjust the drive parameters and corresponds to the software settings
	5. Shaft coupling corresponds to the axis break out or loose	Tighten or replace shaft coupling corresponds to the axis
	6. Data line fault	Replacement of data line
	7. The path is wrong	Import the correct file path
	8. Computer virus or system problems	Reinstall or replace the computer system
Different	1. Material grievances	Pressure level or replacement of materials
	2. NC card loosening or fault	Re-inserted or replaced NC card
	3. Stepper motor failure	Replacement of the stepper motor

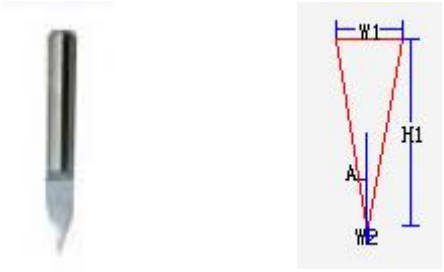
engraving depth, too deep or too shoal	4. Drive failure or electric current sub-set error	Adjust the drive parameters and corresponds to the software settings
	5. Z-axis electrical line failure	Check Z-axis electrical line
	6. Spindle motor failure	Check Spindle motor
	7. Inverter Interference or incorrect data set	Inspection or re-set the parameters of inverter
	8. Electrostatic interference	Check the ground wire
	9. Computer virus or system problems	Reinstall or replace the computer system

Appendix I Common Tools and Application

Common cutting tools includes 3 types: Conical flat, End Mill, V-Bit Mill (for 3D working)

Through clicking any one selection elements of artcut software,like 2D,3D,Cutting,and step into it will finish the creation of engraving tools.

2. Conical flat

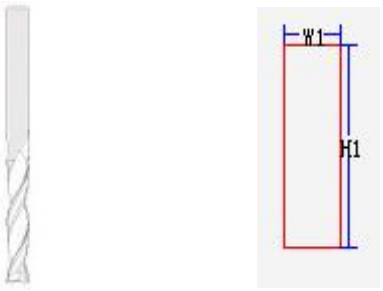


W1: diameter of handle of cutting tools, commonly used : ∮3.175， ∮4， ∮6, etc
W2: diameter of tool point, it affects the engraving result directly. So make it exactly when sets
A: half of the angle made by the two lines; if use 30° tools, A should be 15, by parity of reasoning.
Rules for tool using: use W2 type tool or smaller than it when engraving small letters and try to use bigger tool when engraving bigger letters in order to improve speed; choosing cutting tools depends on the thinnest line of the letter; if necessary, in the condition of not affecting letter effect, using “Node Edit” to modify the strokes is benefit to pass big tool path. 30°angle tool is normally used in engraving badges cutting tools. if the letter is too small, change to single line to count path.

Materials for engraving: double-layer plastic board, PVC board, plexiglass, ABS board, etc.

Materials for cutting: double layer plastic board, ABS board, etc

2. End Mill



W1: the width of tool front-end. Common tool holder diameter likes ∮3.175， ∮4， ∮6; If the cutting material thickness is less than 10 mm small words, we’d better use ∮3.175 tools. if the words become deformed, sometimes the tool holder diameter ∮2 or ∮1.5 can be used for cutting.

H1: refers to the cutting part; material thickness should be less than H1; common H1 length is different according to different material thickness, for example:

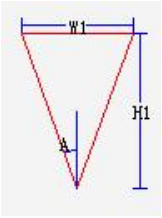
12mm: cut less than 10mm thickness material

17mm: cut less than 15mm thickness material
22mm: cut 20mm thickness material (∮3.175 for PVC and ∮4 for acrylic)

Common engraving material: PVC, plexiglass, wood, etc
Common cutting material: PVC, plexiglass, wood, etc

Rules for using tools: we do not suggest cutting less than 10mm materials with 22mm tools, as it may break the tools; when you want to cut 22mm material but without 22mm tools, we can use 17mm tool temporarily and finish it by different layers.

3. 3D(V-bit)



Such tools are different from those engraving tools we normally use which are made by a alloy material; it is made through welding processing to weld various tool heads under ∮6 tool holder; it is used to engrave different kinds of special shapes files, so it is also called big-end bit or V-bit.

W1: the diameter of the big-end; random accessory is 32mm which is used to cut small 3D letters
A: half value of the angle made by the two lines of knife point; standard tool is 90°, then A should be 45°（like Conical Flat）

W2: width of the knife point; when calculate 3D path specifically, it is required to pass directly, so W2 means not too much, then normally we set it as 0.1 or 0.2.

Tools Application: three-dimension clearance angle word (calculate path with 3D function),
Engraving acrylic from backside, or the letters similar with the one made by writing brush---such letter looks like the tip of a writing brush

4. Other cutting tools: tools for relief carving, lace tools for making various lace, etc.

5. Tools Creation:

Ways for adding a cutting tool: we suggest deleting all default tools in artcut software after installing well; then set up new tools according to detailed requirements.

we take a Conical flat knife of 30°×0.1 for example now

1) Choose 2D, 3D, or cut in artcut software, then click “Tools Storage”

2) Click conical flat, then filling in tool parameters; W1=3.175 A=15 W2=0.1

3) Click tool preview ⟶ add tool ⟶ confirm---then we can add a new tool.

Statement:

Thank you for using our products, we reserves the right to modify products specifications without notice in advance.

The product is subject to change without notice.